6th EUROSIM Congress on Modelling and Simulation
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http://www.eurosim2007.org

Announcement of a special session:

Modelling of Structural Dynamic Systems – Model Reduction Methods

Currently, modeling is more an art than a scientific discipline. Recent developments in computer-aided model generation offer new chances for

- drastically reduced effort for construction of models, e.g. by linear model order reduction (MOR) and its extension to nonlinear problems, symbolic analysis combined with approximation and simplification;
- open interfaces of FEM simulation tools for export of very large systems of ordinary differential equations to be further reduced;
- improved re-usability of model descriptions by application of standardized modeling languages;
- a broad range of public-domain approximation and optimization tools (from simple fitting algorithms to sophisticated optimization and classification algorithms, e.g., support vector machines).

Together with the development cited above, systems become more and more complex, so that systems and their models are structurally changing and / or are systems must be described by several structural different submodels (‘reduced’ models).

Continuous simulation and discrete simulation have different roots, but they are using the same method, the analysis in the time domain. During the last decades a broad variety of model frames (model descriptions) have been developed. In principle, structural-dynamic systems can be seen from two extreme viewpoints.

The one says, in a maximal state space, state events switch on and off algebraic conditions which freeze certain states for a certain periods. The other one say that a global discrete state space controls local (reduced) models with fixed state spaces, whereby the local models may be also discrete or static. These viewpoints derive two different approaches for structural-dynamic systems:

- Maximal State Space Model Approach: This approach can be classified with respect to event implementation. The approach handles all events of any kind within the ODE solver frame, also events which change the state space dimension. Modelica, VHDL-AMS, and Dymola follow this approach, handling also DAE models with index higher than 1; discrete model parts are only supported at event level. MATLAB / Simulink generates also a maximal state space. On the one side, this approach is an extension of the classical one, on the other side, it does not allow the (sequential) combination of really structural different (‘reduced’) models.

- Hybrid Decomposition Approach: The hybrid decomposition approach makes use of ‘external‘ events, which control the sequence and the serial coupling of (reduced) models. A convenient tools for switching between models is a state chart, driven by the external events – which itself are generated by the models. This approach additionally allows not only dynamically changing state spaces, but also different model types, like ODEs, linear ODEs (to be analysed by linear theory), PDEs, different reduced models, etc.

We invite contributions as well from application areas as well as from the area of modelling methods dealing with model reduction methods and / or structural dynamic models. Please send suggestions and extended abstracts to both session organizers.

Session organizers:

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Deadlines:

Announcement of a contribution (to facilitate session organization):
April 30, 2007 (by E-mail to the session organizers)

Submission of 2 page extended abstract or daft paper:
May 20, 2007 (by E-mail to the session organizers)

Acceptance notification after paper review:
June 1, 2007

Full paper (camera ready) due to:
June 30, 2007 (to the conference server with copy to the session organizer)
See also instructions: http://www.eurosim2007.org/Instructions.html